

Remarks

Claims 1-23 and 25-31 are pending in the application. Applicant requests reconsideration and allowance in view of the following remarks.

Telephone Interview

Initially, Applicant wishes to thank the Examiner for the courtesy of the telephone interview conducted on February 26, 2009.

Ogata-based Rejections

Claims 1-9, 14, and 28 (of which claim 1 is independent) are rejected under 35 U.S.C. § 102(b) as anticipated by Ogata, JP 2001-139304. Applicant respectfully traverses the rejection.

As Applicant explained in the September 22, 2008 Amendment in response to the March 25, 2008 Office Action, Ogata discloses a ceramic material that has a pore size on the order of 3 μm (10^{-6} m), whereas claim 1 now specifies that the ceramic membrane exhibits a microporous structure. As Applicant explained and supported with evidence, such microporous structures have pores that are orders of magnitude smaller, i.e., which are on the order of Angstroms (10^{-10} m) or nanometers (10^{-9} m).

In response (see pages 8-9 of the outstanding Office Action), the Examiner disagrees with Applicant's position and asserts that "[t]he term microporous is a very generic term which can be interpreted a variety of ways, including materials with micropores in the micron range." The Examiner supports that assertion by reference to column 7, lines 21-36 of Drozd et al., U.S. 6,827,750. Applicant submits that that rebuttal is ineffectual.

In particular, although Drozd does, in fact, use the term "microporous" to refer to membranes having a pore size within the range of about 0.2 micron to about 100 microns," that is with regard to entirely different types of membranes than those covered by the present claims. In particular, Drozd discloses the following (column 7, lines 3-36):

The fuel-permeable membrane of the invention is advantageously composed of a suitable fuel-insoluble material, preferably selected from polymeric materials, glasses, metals, combinations thereof and mixtures thereof. For example, suitable materials include, but are not limited to, glasses, nylon, cellulose acetate, polyester, polyethylene vinylacetate (EVA), polypropylene vinylacetate (PVA), polyvinyl chloride (PVC),

cellulosic polymers, polyurethane, stainless steel mesh, sintered metal (such as sintered metal discs and the like), metal membrane filters (such as silver membrane filters and the like) and the like, as well as combinations thereof and mixtures thereof. The membrane can alternatively be a material through which a fuel additive can pass, for example, by diffusion (although not necessarily through pores), such as silicone rubber, polyethylene, polyvinylacetate, natural and synthetic rubbers, and other polymers and waxes, and combinations thereof and mixtures thereof. Such membranes are often referred to as semi-permeable membranes.

The fuel-permeable membrane of the present invention preferably comprises a porous membrane, advantageously a microporous membrane, such as those membranes having a pore size within the range of about 0.2 microns to about 100 microns, more preferably between about 5 and about 20 microns, for example, about 10 microns. As referred to herein, a "membrane" may be a single layer or may include multiple plies. The thickness of the membrane is preferably in a range of about 0.1 mm to about 0.5 mm or about 1 mm or about 5 mm, although other thicknesses can be effectively employed. Particularly useful membrane materials include materials useful as filter media, for example, in fuel filters. Examples of such materials include the filter medium sold by Fleetguard-Nelson under the trademark STRATOPORE and filter media available from Whatman and Millipore.

With respect to ceramic membranes, on the other hand, Applicant makes very clear that by the term "microporous," Applicant is referring to membranes having pore sizes on the order of Angstroms. See, in particular, application paragraph [0053] ("Each membrane 10, 22 is constructed from ceramic material and expediently exhibits a microporous structure in which the diameter of the pores is in the main (primarily) less than 20 Å (angstrom)."). In this regard, two basic principles should be borne in mind: 1) a patentee may act as his or her own lexicographer, in which case words in the claims may be given meaning contrary to or inconsistent with one or more of their ordinary meanings if the written description clearly redefines the terms; and 2) during examination, claim terms are to be given their broadest reasonable interpretation in light of the specification as would be understood by one having skill in the art. In view of the quoted portion of the specification and these two claim interpretation canons, Applicant submits that with respect to ceramic membranes, the claim term "microporous" clearly means something on the order of Angstroms, and therefore that Ogata does not disclose that feature. Accordingly, Applicant submits that Ogata does not disclose the claimed subjection and respectfully requests that the rejection be withdrawn.

Claims 10-13, 15-18, and 30 are rejected under 35 U.S.C. § 103(a) based on Ogata in view of Van Andel, WO 01/89665, on which the Examiner relies for the various features recited in those claims. Because those claims all depend directly or indirectly from claim 1, Applicant traverses the rejection for at least the reasons set forth above (Ogata does not disclose microporous ceramic membranes) and requests that the rejection be withdrawn.

Furthermore, Applicant notes that **claim 11** specifies that the second membrane is, in addition to the first membrane, also essentially composed of ceramic material. As Applicant explained previously in the September 22, 2008 Amendment in response to the March 25, 2008 Office Action, Van Andel specifically states that the membrane according to his invention preferably consists of a porous polymer. (Notably, the Examiner has withdrawn the Van Andel-based anticipation rejection – presumably for that precise reason.) Accordingly, even if Ogata were to have been combined with Van Andel, the invention recited in claim 11 would not have been obtained. Therefore, for that additional reason, Applicant traverses the rejection with respect to claim 11 and requests that it be withdrawn at least with respect to claim 11.

Claim 31 is rejected under 35 U.S.C. § 103(a) based on Ogata in view of Binker et al., U.S. 6,536,604, on which the Examiner relies for disclosure of a membrane with a pore size less than 25 Angstroms “as a preferable means to permeate carbon dioxide.” Applicant notes, however, that the Binker membranes do not appear to be ceramic at all. Rather, Binker summarizes the disclosed subject matter (column 2, line 35 through column 3, line 11) as follows:

The dual-layered membrane is produced by contacting the porous membrane support with a surfactant-containing inorganic polymeric sol, resulting in a surfactant/inorganic polymer coated membrane support. The surfactant/inorganic polymer coated membrane support is dried, producing a self-assembled surfactant-templated surfactant/inorganic polymer composite film. This supported composite film is calcined to remove the surfactant templates to produce a surfactant-templated micro- or mesoporous membrane substrate, which serves as an intermediate layer surfactant-templated membrane. The intermediate layer surfactant-templated membrane is then contacted with a second inorganic polymeric sol producing an inorganic polymeric sol coated substrate which is dried, producing a supported inorganic polymer coated dual layer structure. This supported dual-layered structure is then calcined to produce a dual-layered microporous supported membrane in accordance with the present invention.

In one embodiment, both of the polymeric sols include silica, oligomers or polymers. The first or intermediate layer of the dual-layer supported membrane generally has a thickness of less than 100 nm and the second or top layer has a thickness of less than about 100 Å. The average pore diameter of the dual-layer supported membrane gradually decreases in size from about 40 to 60 Å for the support, to about 10 to 25 Å for the intermediate layer, to about 2 to 5 Å for the top microporous layer.

The calcining procedure of the second, top layer includes calcining under a vacuum of less than about 4 psia at a temperature of between 200 to 400° C. and further calcining at a temperature of between 300 to 600° C. The calcining of the first or intermediate layer involves calcining at a temperature between 100 to 150° C. and further heating between 500 to 600° C. The drying of the sols involves drying under conditions of low relative pressure of the liquid constituents.

Accordingly, Applicant submits that even if Ogata were to have been combined with Binker, the invention recited in claim 31 would not have been obtained. Therefore, Applicant traverses the rejection of claim 31 and requests that it be withdrawn.

Kusakabe-based Rejection

Claims 19-23, 25-27, and 29 (of which claim 19 is independent) are rejected under 35 U.S.C. § 102(b) as anticipated by Kusakabe et al., WO 02/11869. In support of that rejection, the Examiner asserts that “[r]egarding the membrane’s ability to block the transmission of hydrogen upon adsorption of CO, where the claimed and prior art product(s) are identical or substantially identical, or are produced by identical or substantially identical process(es) the burden of proof is on applicant to establish that the prior art product(s) do not necessarily or inherently possess the characteristics of the instantly claimed product(s)[.]” Applicant traverses the rejection because the Examiner has assumed too much in making it.

In particular, claim 31 specifies that the membrane is selectively permeable to CO (so that CO can pass through the membrane from a first channel to a second channel); absorbs CO; and blocks transmission of hydrogen through the membrane upon absorption of CO. (Although not recited in the claim, this occurs as a hydrogen-containing, CO-containing mixture of gases flows past the membrane.) The membrane in Kusakabe, in contrast, works in a completely opposite manner altogether. In particular, in Kusakabe, the entire gas mixture – hydrogen, CO, etc. – is forced through the membrane, and the undesired component (CO) is blocked from

passing through it while the desired component (hydrogen) does pass through it. Given the completely opposite manner in which the claim-recited membrane and the Kusakabe membrane perform, it should be self-evident that the two membranes must be different at some level, e.g., the chemical constituent level, the microcrystalline structural level, etc. Thus, Applicant submits that the Examiner has assumed too much in making the rejection and respectfully requests that it be withdrawn.

In view of the foregoing, Applicant submits that all claims are in condition for allowance, and timely Notice to that effect is respectfully requested.

The undersigned representative requests any extension of time that may be deemed necessary to further the prosecution of this application.

The undersigned representative authorizes the Commissioner to charge any additional fees under 37 C.F.R. 1.16 or 1.17 that may be required, or credit any overpayment, to Deposit Account No. 14-1437, referencing Attorney Docket No.: 7589.197.PCUS00.

In order to facilitate the resolution of any issues or questions presented by this paper, the Examiner may directly contact the undersigned by phone to further the discussion.

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